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MEMORANDUM

To: Mitch Gertz, Solvay Specialty Polymers USA, LLC
From: Matthew Behum, Integral Consulting Inc.
Date: May 19, 2014
Subject: Private Potable Well Field Sampling Plan
Project No.: C1165 Task 11 – Private Well Sampling

This technical memorandum presents a field sampling plan (FSP) for private well sampling at residences throughout West Deptford and East Greenwich Townships. A preliminary set of locations was originally designated at the May 7, 2014 PFNA Status Update meeting with New Jersey Department of Environmental Protection (NJDEP) based on data provided by NJDEP and West Deptford Township. Subsequently, following a meeting with officials from East Greenwich on Wednesday May 14, the address list was expanded to include locations that are not currently listed in the database of permitted wells maintained by NJDEP. We anticipate that this list will be appended as additional residents are identified during the course of the week. Rather than updating the FSP after each additional location is identified, a single updated tabular summary will be generated at the end of the first week of sampling. The sampling is planned as part of an overall canvassing effort, which is an important step in verifying if potable wells are present and currently in use in areas along the groundwater flow path downgradient of the Solvay Specialty Polymers USA, LLC (Solvay) Site ("Site"). Potable well water will be analyzed for concentrations of perfluoroalkyl compounds (PFCs). In advance of the sampling, residents will receive a letter that explains the purpose of this sampling effort along with a flyer from NJDEP that provides information about PFC exposure and potential health effects.

SAMPLING PROCEDURES

Schedule

Sampling will occur over a one-week period beginning Tuesday May 20, 2014 and ending Friday May 23, 2014. Residents will first be presented with a questionnaire using a written form prepared by NJDEP entitled, Potable Well Information Form (Attachment A).

Residents can use this form to provide contact information, permission to take a sample, and operational information for potable wells.

In the event that a resident is unavailable or wishes to schedule sampling for a later date, contact information will be provided for the resident to speak with a Solvay representative to coordinate a future sampling day and time using the hotline number 1-800-936-8159.

Field Equipment and Supplies

Field equipment and supplies include sampling equipment, sample containers, coolers, shipping containers, log books and forms, personal protection equipment, and personal gear. Protective wear (e.g., gloves) is required to minimize the possibility of cross-contamination between sampling locations. Additional information on protective wear required for this project is provided in Attachment B1 – *Site Health and Safety Plan* of the *Solvay Field Sampling Plan* (Integral 2014).

Sample jars, preservatives, distilled/deionized water, coolers, and packaging material for the samples will be supplied by the analytical laboratory. Pursuant to the NJDEP sampling guidance (NJDEP 2005), sample containers will not be held for more than 4 days between sample container shipment from the testing laboratory and sample shipment back to the laboratory for analysis. The field lead and field personnel in charge of sample handling in the field will use a sample matrix table (Table 1) as a quality control check to ensure that all samples have been collected at a given station. These tables include the total number and type of sample jars required for each analysis at each sampling station.

Commercially available, pre-cleaned jars will be used for the samples, and the testing laboratories will maintain a record of certification from the suppliers. The bottle shipment documentation will include batch numbers. With this documentation, jars can be traced to the supplier, and bottle-wash analysis results can be reviewed. The bottle-wash certificate documentation will be archived in Integral Consulting Inc.'s (Integral) project file.

Sample containers will be clearly labeled at the time of sampling. Labels will include the task name, sample number, sampler's initials, analyses to be performed, and sample date and time. Specific identifiers such as the address or name of the occupant will not appear

on the sample label on the bottle; this information is considered confidential and will be maintained in a separate table that will be made available to NJDEP. Sample numbering and identification procedures are described in detail in Integral (2014).

Weather

During sampling activities, weather will be checked using the following web site:

Weather conditions and forecasts: National Oceanic and Atmospheric Administration (NOAA) site for the Philadelphia area <http://graphical.weather.gov/sectors/phi.php#tabs>.

Special Sampling Consideration

Because PFCs are also found in numerous everyday items, the following special precautions will be taken during all sampling activities:

- No use of Teflon®-containing materials (e.g., Teflon® tubing, bailers, tape, sample jar lid liners, plumbing paste)
- No Tyvek® clothing will be worn by the field sampling team
- Clothes treated with stain- or rain-resistant coatings will be avoided or go through several washings prior to use by the field sampling team
- No Post-It® notes will be used by the field sampling team
- No fast food wrappers, disposable cups, or microwave popcorn will be brought near sampling locations
- After handling any of the above items, field personnel will wash their hands thoroughly with soap and water prior to any sampling activities
- No use of chemical (blue) ice packs or foil will be allowed.

Nitrile gloves will be worn during all sample collection activities. Sample handling procedures will follow procedures outlined by the project FSP (Integral 2014).

Sampling Process

Figure 1 shows the locations of private potable wells in West Deptford and East Greenwich Townships that were identified based on data sources and processing steps summarized in Attachment B. Figures 2a through 2r show detailed parcel maps of private wells tentatively slated for sampling on individual days. The wells are broken up into four sub-regions reflecting different sampling days. Approximately 20–25 wells will be sampled by 2 teams

of 2 individuals in a sampling day. Sampling is expected to be completed within 4 days. To the extent practicable, both teams will work within the same township block during sampling in order to remain close geographically. Health and safety considerations during the sampling event will follow those outlined in the project FSP (Integral 2014; Attachment B1).

Sampling for each day will begin at 9:00 a.m. and conclude by 4:00 p.m., in order to minimize disturbances to the community. Each team will approach respective residences, show identification, confirm they received the information packet in the mail, and obtain permission to obtain water samples. The team will also confirm whether the resident has carbon-based water filtration in their system. If so, the team will inquire if 1) a pre-treatment distribution point (probably outside) is available to take a sample in addition to a post-treatment point (e.g., indoor faucet); and 2) if the team can take a few pictures of the water treatment unit.

The team will additionally note on Table 1 (sample matrix) whether the location is commercial or private residential. The sampling team will then request if the resident could fill out a questionnaire (Attachment A) if one is not already on file.

If only one sample is possible (i.e., no pre- and post- carbon filtration samples are available), the single sample will be preferably collected from outdoor distribution points such as a spigot. Field teams will confirm that the source of well water for the outdoor distribution point is the same as the indoor taps. If outdoor distribution points are not available, permission will be requested to collect water samples from an available tap within the residence. Samples will be collected with the aerator removed and without any attached faucet water treatment (e.g., PUR® faucet filter). Because residential water is expected to be used frequently (daily), effective purging can be accomplished over a short time period. The sampling team will request permission to let the distribution tap run for only 3 minutes prior to sampling in order to ensure any particulates or impurities flow through the system. If the 3-minute purge will occur outside, water will be diverted from the house via a corrugated plastic rain gutter pipe aimed away from the building. Following this 3-minute flow, two 250-mL sampling bottles from Eurofins Eaton Analytical, Inc. (Eurofins) will be filled per residential sample for PFCs only according to procedure outline in Integral (2014). Following sampling, bottles will be labeled and stored on wet ice according to the project FSP (Integral 2014). If the occupant or owner is not home, the information packet from the mailer and a contact number will be placed near the doorjamb requesting the resident call Solvay's representative to schedule sampling in the near future.

If a resident of West Deptford or East Greenwich requests that the field sampling team collect a sample from a property that has a potable well, even though the property is not on the initial address list, the field sampling team will obtain samples from that property

following the procedures noted above. Extra bottles will be ordered for this purpose. The resident will be asked to complete the questionnaire (Attachment A).

Samples collected on the same day will be packaged in coolers together. At the end of a sampling day (by 4:00 p.m.), completed samples will be packed with ice and sealed in a cooler with documented chains of custody (COC) according to the project FSP (Integral 2014) and shipped overnight to Eurofins (Monrovia, CA) for analysis.

Field Quality Control

Field quality control samples for the private well investigation will include field duplicates and travel/field blanks. The procedures and rationale for collecting these samples are described below.

- **Field duplicate** – Sample will be used to assess the variability in concentrations of co-located samples due to the combined effects of sample processing in the field and laboratory as well as chemical analysis. Field duplicates will be prepared by collecting two aliquots for the sample and submitting them for analysis as separate samples. A blind field duplicate sample will be collected for at least 5 percent of groundwater samples. Samples will be assigned unique numbers and will not be identified as field duplicates to the laboratory.
- **Field-blank** – Sample will be used to determine whether or not contaminants may have been introduced during the shipment of the groundwater samples from the field to the laboratory or during sampling activities. Field blanks will be prepared at the testing laboratory by pouring distilled/deionized water into a 250-mL bottle and tightly closing the lid. In the field, the blank will be opened and poured into an empty bottle, sealed, and labeled as a field blank. One field blank will be collected every day during private well sampling (4 field blanks total).

Sample Labeling

Each sample from a given station will also have a unique label identifier. Sample identifiers will be established before field sampling begins and assigned to each sample as it is collected. Sample identifiers consist of codes designed to fulfill three purposes: 1) to identify related samples (i.e., field split samples) to ensure proper data analysis and interpretation; 2) to obscure the relationships between samples so that laboratory analysis will be unbiased by presumptive similarities between samples; and 3) to track individual sample containers to ensure that the laboratory receives all of the material associated with a single sample. To accomplish these purposes, each container is assigned a sample number and a tag number. These codes and their uses are described below:

- A sample identifier for each sample will be created as follows: the well number (e.g., RES0001), followed by the month, day, and year that the sample was collected (e.g., 022814), and this would be followed by a two-letter code for the kind of sample collected at a given location (PW = private well). An example sample identifier for a residential well sample at location 01 taken on May 20, 2014 would be RES0001--052014-PW.
- Each field split sample will have the same sample identifier, but with “-DUP” at the end of the sample identifier (e.g., RES0001--052014-PW-DUP).
- The sample number is an arbitrary number assigned sequentially to each sample collected (e.g., PW0001, PW0002). Each field split sample will have a different sample number, and the sample numbers of related field quality control samples may not share any content. The sample number will appear on the sample containers and the COC forms.
- A unique numeric sample tag number will be attached to each sample container. Eurofins requests two bottles get filled per PFC analysis; therefore, two tag numbers will be assigned to each individual sample. The tag number is written on top of the sample bottle. The tag number will appear on the COC forms. Tag numbers will be used by laboratories only to confirm that they have received all of the containers that were filled and shipped. Data will be reported by sample number.
- Field blanks will be labeled with sequential numbers starting at 900 instead of station numbers. For example, the first field blank for a private well sample will be labeled as FB-901.

REFERENCES

Integral. 2014. Field sampling plan. Appendix B. In: Perfluoroalkyl Compounds Work Plan. Prepared for Solvay Specialty Polymers USA, LLC. Integral Consulting Inc., Annapolis, MD. Anticipated June [note that this updates the November 2013 draft, which provides all of the same sample handling procedures that will be followed for this FSP].

NJDEP. 2005. Field sampling procedures manual. Available at: www.state.nj.us/dep/srp/guidance/fspm/pdf/fsmp2005.pdf. New Jersey Department of Environmental Protection, Trenton, NJ. 574 pp. August.

FIGURES

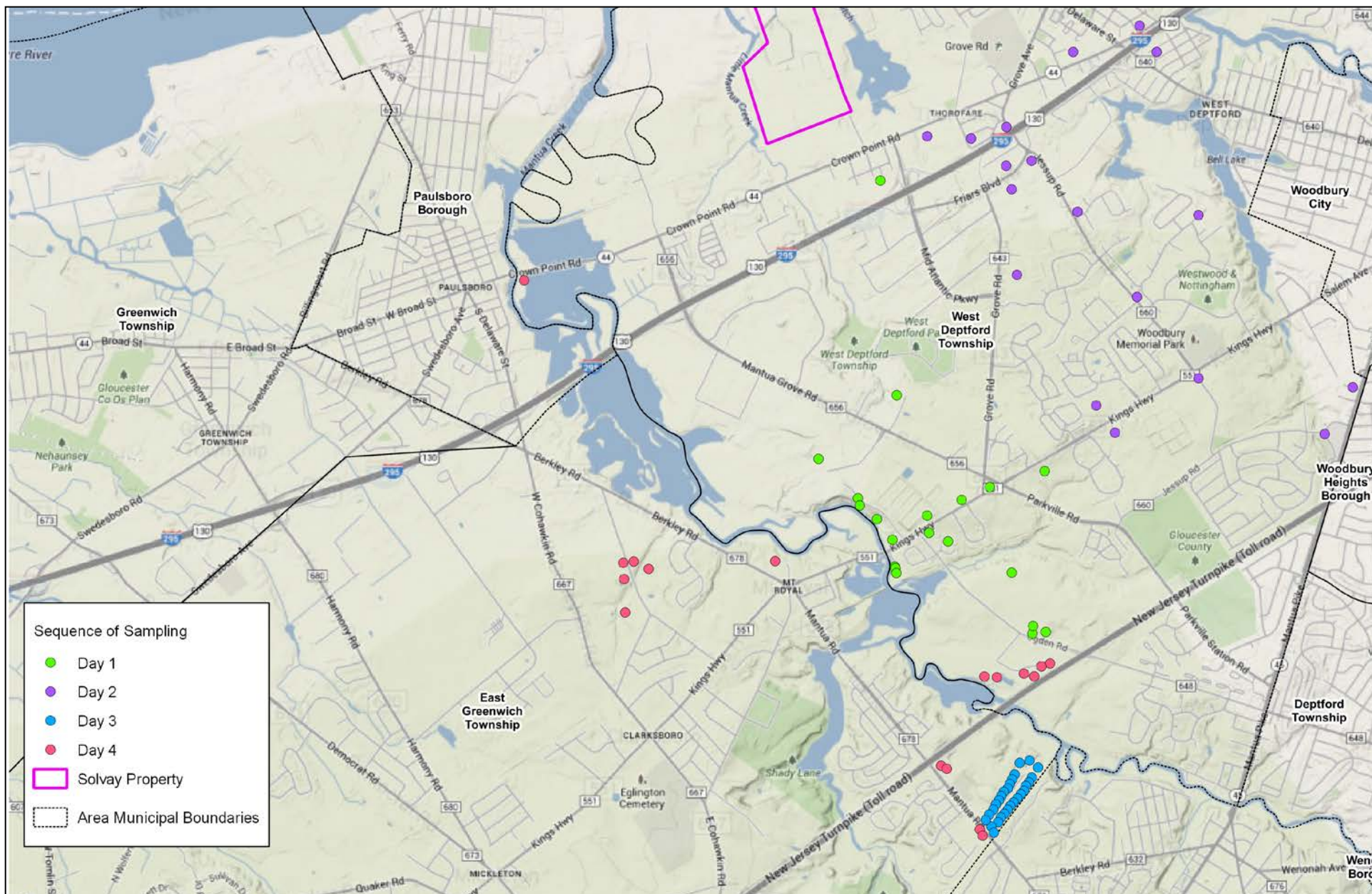


Figure 1.
Sequence of Sampling by Day
Field Sampling Plan

TABLES

Table 1. Field Sampling Matrix, Private Potable Well Sampling

Township	Sample #	Addressee	Street Address	City, State, Zip	X	Y	Commercial/ Residential	Sample ID	PFC TAG 1	PFC TAG 2	Sampling Day	Date	Time	Sampled by
East Greenwich Township	PW00001						Residential	RES0001	Tag #	Tag #				
	PW00002						Residential	RES0002	Tag #	Tag #				
	PW00003						Residential	RES0003	Tag #	Tag #				
	PW00004						Residential	RES0004	Tag #	Tag #				
	PW00005						Residential	RES0005	Tag #	Tag #				
	PW00006						Residential	RES0006	Tag #	Tag #				
	PW00007						Residential	RES0007	Tag #	Tag #				
	PW00008						Residential	RES0008	Tag #	Tag #				
	PW00009						Residential	RES0009	Tag #	Tag #				
	PW00010						Residential	RES0010	Tag #	Tag #				
	PW00011						Residential	RES0011	Tag #	Tag #				
	PW00012						Residential	RES0012	Tag #	Tag #				
	PW00013						Residential	RES0013	Tag #	Tag #				
	PW00014						Residential	RES0014	Tag #	Tag #				
	PW00015						Residential	RES0015	Tag #	Tag #				
	PW00016						Residential	RES0016	Tag #	Tag #				
	PW00017						Residential	RES0017	Tag #	Tag #				
	PW00018						Residential	RES0018	Tag #	Tag #				
	PW00019						Residential	RES0019	Tag #	Tag #				
	PW00020						Residential	RES0020	Tag #	Tag #				
	PW00021						Residential	RES0020	Tag #	Tag #				
	PW00022						Residential	RES0021	Tag #	Tag #				
	PW00023						Residential	RES0022	Tag #	Tag #				
	PW00024						Residential	RES0023	Tag #	Tag #				
	PW00025						Residential	RES0024	Tag #	Tag #				
	PW00026						Residential	RES0025	Tag #	Tag #				
	PW00027						Residential	RES0026	Tag #	Tag #				
	PW00028						Residential	RES0027	Tag #	Tag #				
	PW00029						Residential	RES0028	Tag #	Tag #				
	PW00030						Residential	RES0029	Tag #	Tag #				
	PW00031						Residential	RES0030	Tag #	Tag #				
	PW00032						Residential	RES0031	Tag #	Tag #				
	PW00033						Residential	RES0032	Tag #	Tag #				
	PW00034						Residential	RES0033	Tag #	Tag #				
	PW00035						Residential	RES0034	Tag #	Tag #				
	PW00036						Residential	RES0035	Tag #	Tag #				
	PW00037						Residential	RES0036	Tag #	Tag #				
	PW00038						Residential	RES0037	Tag #	Tag #				
	PW00039						Residential	RES0038	Tag #	Tag #				
	PW00040						Residential	RES0039	Tag #	Tag #				
	PW00041						Residential	RES0040	Tag #	Tag #				
	PW00042						Residential	RES0041	Tag #	Tag #				

Table 1. Field Sampling Matrix, Private Potable Well Sampling

Township	Sample #	Addressee	Street Address	City, State, Zip	X	Y	Commercial/ Residential	Sample ID	PFC TAG 1	PFC TAG 2	Sampling Day	Date	Time	Sampled by
West Deptford Township	PW00043						Residential	RES0041	Tag #	Tag #				
	PW00044						Residential	RES0042	Tag #	Tag #				
	PW00045						Residential	RES0043	Tag #	Tag #				
	PW00046						Residential	RES0044	Tag #	Tag #				
	PW00047						Residential	RES0045	Tag #	Tag #				
	PW00048						Commercial	RES0046	Tag #	Tag #				
	PW00049						Residential	RES0047	Tag #	Tag #				
	PW00050						Residential	RES0048	Tag #	Tag #				
	PW00051						Residential	RES0049	Tag #	Tag #				
	PW00052						Residential	RES0050	Tag #	Tag #				
	PW00053						Residential	RES0051	Tag #	Tag #				
	PW00054						Commercial	RES0052	Tag #	Tag #				
	PW00055						Residential	RES0053	Tag #	Tag #				
	PW00056						Commercial	RES0054	Tag #	Tag #				
	PW00057						Residential	RES0055	Tag #	Tag #				
	PW00058						Residential	RES0056	Tag #	Tag #				
	PW00059						Residential	RES0057	Tag #	Tag #				
	PW00060						Residential	RES0058	Tag #	Tag #				
	PW00061						Commercial	RES0059	Tag #	Tag #				
	PW00062						Residential	RES0060	Tag #	Tag #				
	PW00063						Residential	RES0061	Tag #	Tag #				
	PW00064						Commercial	RES0062	Tag #	Tag #				
	PW00065						Commercial	RES0062	Tag #	Tag #				
	PW00066						Residential	RES0063	Tag #	Tag #				
	PW00067						Commercial	RES0064	Tag #	Tag #				
	PW00068						Residential	RES0065	Tag #	Tag #				
	PW00069						Commercial	RES0066	Tag #	Tag #				
	PW00070						Residential	RES0067	Tag #	Tag #				
	PW00071						Residential	RES0068	Tag #	Tag #				
	PW00072						Residential	RES0069	Tag #	Tag #				
	PW00073						Commercial	RES0070	Tag #	Tag #				
	PW00074						Residential	RES0071	Tag #	Tag #				
	PW00075						Residential	RES0072	Tag #	Tag #				
	PW00076						Residential	RES0073	Tag #	Tag #				
	PW00077						Residential	RES0074	Tag #	Tag #				
	PW00078						Residential	RES0075	Tag #	Tag #				
	PW00079						Residential	RES0076	Tag #	Tag #				
	PW00080						Residential	RES0077	Tag #	Tag #				
	PW00081						Residential	RES0078	Tag #	Tag #				
	PW00082						Residential	RES0079	Tag #	Tag #				
	PW00083						Residential	RES0080	Tag #	Tag #				
	PW00084						Residential	RES0081	Tag #	Tag #				

Table 1. Field Sampling Matrix, Private Potable Well Sampling

Township	Sample #	Addressee	Street Address	City, State, Zip	X	Y	Commercial/ Residential	Sample ID	PFC TAG 1	PFC TAG 2	Sampling Day	Date	Time	Sampled by
	PW00085						Residential	RES0082	Tag #	Tag #				
	PW00086						Residential	RES0083	Tag #	Tag #				
	PW00087						Residential	RES0083	Tag #	Tag #				
	PW00088						Commercial	RES0084	Tag #	Tag #				

ATTACHMENT A

POTABLE WELL INFORMATION FORM

WELL LOCATION	
Street Address:	_____
Municipality:	_____
County:	_____
Block/Lot #:	_____

Please complete the questions below by writing the answer in the space provided or by circling the most appropriate response, and return this form to us within 10 days of receipt.

1. Indicate your relationship to this property. (Circle one)

Please provide your contact information/ mailing address.

PHONE #: _____ (home) _____ (work) _____ (cell)

E-MAIL ADDRESS:

PHONE #: (home) (work) (cell)

- (Over)

If **YES**, please enclose a copy of the results if possible.

a) What date was it most recently tested? _____

b) Who tested the well water? _____

c) What was the well tested for? (Circle all that apply.)

Bacteria

Volatile Organics

Metals

Other (please explain): _____

d) Did the sampling detect any contaminants? **YES NO**

8. We would like to sample drinking water. If you have a treatment system that includes a carbon filter, we would also like to sample pre-treated water.

Do you have any treatment system(s) on the well? **YES NO**

If **YES**,

a. What type of water treatment system(s) do you have? (Circle all that apply)

Softener

Iron removal

Sediment Filter

Carbon Filter

Turbidity removal

pH adjustment

Disinfection

Chlorinators

Acid neutralizer

Other: (please specify): _____

b. Can the treatment system be bypassed to collect an untreated water sample? **YES NO NOT SURE**

If YES, how can the system be bypassed? (Circle all that apply)

Outside spigot bypasses treatment

Faucet in basement

Faucet on holding tank

Treatment system can be shut off

If **NO**,

Is there an outside spigot from which we can take a sample? **YES NO**

Where is the spigot located? _____

9. If we cannot take an untreated sample from the outside spigot, would it be possible to schedule a meeting with someone at this location on a weekday to collect a water sample? **YES NO**

10. Please provide any other information that you feel would be helpful for us to know about your well.

ATTACHMENT B

TECHNICAL MEMORANDUM REGARDING PRIVATE POTABLE WELL SELECTION PROCESS



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MEMORANDUM

To: Mitch Gertz, Solvay Specialty Polymers USA, LLC
From: Steve Helgen, Integral Consulting Inc.
Date: May 19, 2014
Subject: Private Potable Well Selection Process
Project No.: C1165 Task 11 – Private Well Sampling

This memorandum summarizes a list of the steps taken by Integral to develop a mailing list of private potable wells within western West Deptford and southeastern East Greenwich Townships. This initial list was shared with New Jersey Department of Environmental Protection (NJDEP) and U.S. Environmental Protection Agency (EPA) by email yesterday and includes locations that are likely to have one or more potable wells and a mailing address based on our review of multiple datasets provided by NJDEP, West Deptford, and other information available to the public. The current list is provisional and subject to change. We will continue to review and reconcile available information and any additional well coordinates will be added to the list in advance of the field verification and sampling effort scheduled to begin on May 20, 2014.

Datasets and Information Sources

The following datasets and information sources were used to identify locations that are likely to have private potable wells.

Dataset or Information Source	File Type	Description
NJDEP Dataset	MS Excel Workbook	482 records. List of wells in Gloucester County, NJ maintained by NJDEP and provided by the LSRP in Feb. 2014. Includes information on Well Permit ID, coordinates, and street addresses.
West Deptford Dataset	MS Excel Workbook	46 records. List of wells in West Deptford Township.

Dataset or Information Source	File Type	Description
New Jersey Well Permit Database	On-line utility ^a	Cross reference Well ID by block and lot number, county and date, permit number, street address, drillers and pump installers, and permit report by county.
Google Earth	On-line utility ^b	Aerial photographs of physical structures at the block and lot scale.
Gloucester County Tax Parcel Database	On-line utility ^c	List of all tax parcels within Gloucester County. Includes address, block, and lot numbers.

Notes:

^a NJ Well Permits: http://datamine2.state.nj.us/DEP_OPRA/OpraMain/categories?category=WS+Well+Permits

^b Google Earth: www.google.com/earth/

^c Gloucester County Tax Parcels:
www.gloucesterva.info/GeographicInformationSystemsGIS/tabid/692/Default.aspx

Processing Steps

The following sequence of steps were used to improve the completeness and accuracy of the raw data received from NJDEP and West Deptford.

1. Extract the table "WellSearch_Wells_XY" from the flat file provided by NJDEP.
2. Merge with flat file from West Deptford to develop a database with common field names describing identifiers of the well, physical location, and resident or owner.
3. Filter the combined dataset by the NJDEP database field name Well_Use:

Retain	Exclude
Domestic	Agric/Hort/Aqua Irrigation
Domestic Replacement	Industrial
Non-Public	Industrial Replacement
Public Community	Irrigation
Public Community Replacement	Irrigation Replacement
Public Non-Community	Livestock
Public Non-Community Replacement	Livestock Replacement
	Recovery
	Test

4. Filter by the NJDEP database field name Status_of_Well:

Retain	Exclude
Active Authorized Proposed	Decommissioned Inactive

5. Remove duplicates, defined as records with the same Well Permit IDs.
6. Confirm that locations with coordinates are associated with a physical structure that can be logically placed in West Deptford or East Greenwich using Google Earth.
7. Append records that are missing coordinates based on reported physical address or block/lot estimates.
8. Import dataset with coordinates into a geographic information system (GIS) to reconcile locations outside of township boundaries.
9. For records that fall outside of the township boundaries, search for Well Permit IDs using the online New Jersey Well Permit Database to confirm coordinates or identify additional coordinate information.
10. Confirm and append information on physical address and parcel information using parcel records from the Gloucester County Tax Parcel database.
11. Wells inside an area downgradient from the site were queried in GIS and retained. Wells that fell outside of the area downgradient from the site (outside of western West Deptford and select wells near the East Greenwich/West Deptford boundary) were removed.
12. A preliminary address list was generated for mailing introduction letters based on locations where physical addresses could be identified from the preceding steps.
13. The address list was appended following a meeting with East Greenwich officials on May 14, 2014. Additional locations were added to include residences on Fawn Meadow Road and Whiskey Mill Road.